

Self-Control in Hyperactive Boys in Anger-Inducing Situations: Effects of Cognitive-Behavioral Training and of Methylphenidate¹

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The effects of cognitive-behavioral intervention and methylphenidate on anger control in hyperactive boys were investigated in two studies. The anger-inducing stimuli in both studies involved verbal provocation from peers. Study 1 assessed a brief intervention using self-control strategies, while Study 2 employed a longer training period and a control intervention that focused on enhancement of empathy. Both studies included methylphenidate versus placebo comparisons. Methylphenidate reduced the intensity of the hyperactive boys' behavior but did not significantly increase either global or specific measures of self-control. Cognitive-behavioral treatment, when compared to control training, was more successful in enhancing both general self-control and the use of specific coping strategies. There was no advantage for the combination of methylphenidate plus cognitive-behavioral intervention. Implications for intervention to ameli-

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orate the social and interpersonal difficulties of hyperactive children are discussed.

It is becoming increasingly apparent that hyperactive children encounter major hurdles in negotiating the everyday demands of their social environments (see Campbell & Paulauskas, 1979; Milich & Landau, 1982; Pelham & Bender, 1982; Ross & Ross, 1982; Whalen, 1983).³ Hyperactive children have difficulty making and keeping friends, and their behavior with peers is often evaluated by adults as inappropriate and aggressive. Even the peers of hyperactive children perceive the problematic nature of their behavior, as indicated by both negative sociometric ratings and negative peer nominations (Milich & Landau, 1982), as well as by endorsement of rating categories—e.g., inattention, overactivity—that correspond to adult characterizations (Glow & Glow, 1980). It is noteworthy also that follow-up studies of hyperactive children have documented the persistence of social and interpersonal problems into adolescence and adulthood (Hoy, Weiss, Minde, & Cohen, 1978; Weiss, Hechtman, Perlman, Hopkins, & Wener, 1979). Intervention directed toward the amelioration of such critical interpersonal difficulties is clearly warranted.

In reference to the interpersonal domain of anger and aggression, the diagnostic distinctiveness of hyperactivity (or attention deficit disorder) from conduct disorder is currently being debated in the literature (see Lahey, Green, & Forehand, 1980; Loney, Langhorne, & Paternite, 1978; Milich, Loney, & Landau, 1982; O'Leary & Steen, 1982; Prinz, Connor, & Wilson, 1981). Regardless of the outcome of this lively controversy, there is little question that many, if not the majority of hyperactive children have problems with control of anger and aggression. The goal of the present studies was to assess the effectiveness of two major interventions, stimulant medication and cognitive-behavioral training, in reducing these problematic behaviors.

Stimulant medication is often the intervention of choice for hyperactivity (Barkley, 1977; Cantwell & Carlson, 1978; Conners & Werry, 1979). Most evidence for stimulant effects on social behavior comes from teacher and parent rating scales (e.g., Conners, 1976; Goyette, Conners, & Ulrich, 1978) that provide global indexes of reduced behavioral disruption (Conners & Werry, 1979; Whalen & Henker, 1980). Several

³Because many of the subjects for the studies presented in this paper were recruited before implementation of the third edition of the American Psychiatric Association's *Diagnostic and Statistical Manual* (American Psychiatric Association, 1980), which introduces the diagnosis of attention deficit disorder, the term *hyperactive* will be used throughout the paper to refer to children with the overlapping diagnoses of hyperkinesis, hyperactivity, and attention deficit disorder with hyperactivity.

recent studies employing systematic behavior observation strategies to assess medication effects on social behavior have focused chiefly on (a) attention and social disruption in the classroom (Whalen et al., 1978; Whalen, Henker, Collins, Finck, & Dotemoto, 1979) and (b) the style and content of peer communication in dyads (Whalen, Henker, Collins, McAuliffe, & Vaux, 1979) or small groups (Whalen, Henker, Dotemoto, Vaux, & McAuliffe, 1981). Still lacking, however, are assessments of medication effects on the responses of hyperactive children to situations that induce anger and aggression.

Behavioral and cognitive-behavioral strategies have emerged as promising treatments for children with diverse behavior disorders (see reviews by Craighead, Wilcoxon-Craighead, & Meyers, 1979; Franks, Wilson, Kendall, & Brownell, 1982; Hobbs, Moguin, Tyroler, & Lahey, 1980; Ollendick & Cerny, 1981). Operant techniques, when used with hyperactive children in the classroom, reduce behavioral disruption and increase on-task behavior (O'Leary, Pelham, Rosenbaum, & Price, 1976; Rosenbaum, O'Leary, & Jacob, 1975). Newer approaches, emphasizing cognitive mediational strategies, have been shown to enhance a reflective cognitive style as well as to increase some measures of academic performance (Barkley, Copeland, & Sivage, 1980; Cameron & Robinson, 1980; Douglas, Parry, Marton, & Garson, 1976). The effect of such behavioral treatments on hyperactive children's negative interactions with peers has been less well documented.

A class of cognitive-behavioral techniques termed stress inoculation interventions has been recently developed to help adults cope with and rechannel maladaptive anger. Originally devised for problems of anxiety (Meichenbaum, 1975), these cognitive-behavioral strategies focus on the modification of automatic chains of cognitions that lead to aggression and on rehearsal of coping strategies with progressively stronger "stressors." These and related cognitive-behavioral strategies have received initial tests with adult and adolescent populations (McCullough, Huntsinger, & Nay, 1977; Novaco, 1975, 1979; Schlichter & Horan, 1981) but have yet to receive empirical evaluation with children who have problems of anger control.

One preliminary investigation attempted to assess the effects of cognitive mediation and behavioral rehearsal on "hyperactive"/impulsive children's angry and aggressive responses to verbal provocation from peers (Goodwin & Mahoney, 1975). Intervention for the three subjects consisted of videotaped modeling of coping self-statements by another child. The evidence suggested positive effects of the modeling and the prompting of cognitive-behavioral strategies. As noted by the authors, conclusions must be regarded as tentative, given the small number of subjects and the lack of appropriate controls for the brief intervention.

The present studies assessed the effectiveness, for hyperactive children, of individually tailored cognitive-behavioral interventions based, in part, on the stress inoculation paradigm. In Study 1, all participants received brief individual coaching in cognitive-behavioral strategies. In Study 2, the effects of more extensive training were contrasted with an alternative intervention based largely on training in perspective taking and the enhancement of empathy. In both studies, stimulant medication versus placebo was introduced as a between-subjects variable to ascertain the interactive effects of medication with the psychological treatments.

A methodological aim was to test these interventions in an environment closely resembling the natural settings that provoke anger and aggression from hyperactive children. A situation consisting of direct taunting and teasing from familiar peers was chosen as the provocation environment.

STUDY ONE

Method

Subjects

Twenty-one hyperactive boys in late elementary or early junior high school grades (aged 8 through 13 years) served as participants. Each boy had been taking medication (methylphenidate hydrochloride, Ritalin®) on a regular basis, as prescribed by his physician. Participants were recruited for a 3-week, 6-session outpatient intervention program at UCLA through public schools in Los Angeles, pediatricians, and announcements in local newspapers. Criteria for acceptance included the following: primary diagnosis of hyperactivity or hyperkinesis by the child's physician; average or above-average intellectual functioning; no evidence of mental retardation, severe emotional disturbance, or organicity; absence of acute family distress; treatment with a stable dosage of methylphenidate for at least 3 months prior to the start of the program; judgment of positive response to methylphenidate treatment by physician and family; and no concurrent treatment with other psychotropic medication.

Intervention Procedures

Three consecutively recruited boys were formed into triads for group training in cognitive self-regulation skills. Groups met twice weekly for 2

hours (once after school on a weekday, once on a weekend) for the 3-week program. Each training triad was led by two clinical psychology graduate students. To ensure standardization of training format across groups, all sessions were carefully scripted (Hinshaw, Alkus, Whalen, & Henker, 1979). Training sessions were held at the UCLA Psychology Clinic and were videotaped for later scoring.

The training curriculum followed from the self-instructional and problem-solving paradigms of early practitioners of cognitive-behavioral strategies with impulsive children (Meichenbaum & Goodman, 1971; Meichenbaum, 1977; Spivack & Shure, 1974). The work of Douglas et al. (1976) and Kendall (1977) was also incorporated. Subjects initially learned a set of specific problem-solving strategies and applied these to a series of academic and fine-motor tasks. In the second, third, and fourth sessions, interpersonal problem solving was introduced. Participants first generated and evaluated solutions to vignettes of interpersonal problems read by the trainers and later rehearsed strategies for self-control in role-plays of common social situations (e.g., meeting a new boy, playing a competitive game). The provocation assessments for the present study were held during the fifth training session.

Behavioral Provocation Tests

Trainers opened this fifth session by explaining that the boys would practice showing self-control while being teased. In order to make the provocations realistic, each participant was asked to list the names or phrases that particularly bothered him. Next, the trainers engaged in a prescribed "argument" with each other, modeling the type of verbal taunting to be done. The boys were instructed not to leave their chairs or resort to physical provocation in the upcoming assessments and were reminded that the exercises were not actual attacks but, rather, realistic practice sessions.

One boy (chosen randomly) was then taken from the room by a trainer, who engaged him in general discussion of the day's events but did not discuss plans for the impending provocation. The two remaining boys practiced verbal taunting with the other trainer by using the names on the list to get the "target" boy upset. The target then entered the room, sat down next to the taunters, and attempted to listen to the teasing for 45 seconds. If, in the judgment of the trainers, the provocation was getting out of hand or the target was too upset, the assessment was terminated before the time limit. Each subject, in turn, served as the target.

Following the first round of provocations, strategies for self-control were reviewed and practiced with the group as a whole. Each boy was

encouraged to generate one plan for exhibiting self-control in a subsequent provocation. Plans chosen included reading a book, looking out the window, engaging the teasers in calm conversation, or simply ignoring the taunts. Finally, a second round of provocations was held, with procedures nearly identical to the first. The key difference was that each target practiced his chosen plan for self-control with a trainer while awaiting his turn outside the room. During the second provocation, the taunters were allowed to deviate slightly from the list of names disclosed by the target in order to keep the level of novelty—and thus of provocation—sufficiently high.

Medication Procedures

At the start of the intervention program, participants were assigned to either methylphenidate or placebo conditions for the entire 3-week period. Assignment was made according to a modified random selection procedure, with the constraint that all three boys in each triad not be in the same medication state. In this double-blind trial, medication or placebo tablets were supplied to each family in dated envelopes containing the dosages regularly prescribed by the child's physician. All medication was placed in transparent gelatin capsules to disguise the taste difference between methylphenidate and placebo. Noon dosages administered at the children's schools were similarly packaged; parents informed school personnel of the need to use these medication procedures for the duration of the program. These noontime dosages, most pertinent to the present afternoon training sessions, ranged from 5 to 20 mg ($M = 9.64$ mg) and from .14 to .55 mg/kg ($M = .28$ mg/kg).⁴ For the present study, 11 participants were in the medication condition and 10 in the placebo condition. Because 1 boy was out of camera range during the behavioral tests, 10 medicated boys and 10 placebo boys constituted the final sample.

Measures

Measures were derived, first, from inspection of current literature regarding the effects of methylphenidate on the style of hyperactive child-

⁴Six subjects in Study 1 regularly received only morning dosages of methylphenidate. Through discussion with family physicians, arrangements were made to add an afternoon dosage or half dosage on the days of afternoon training sessions, in order that the participants be actively medicated for training procedures and provocation assessments. In general, the dosages received by the participants were on the low side; these preexisting dosages were maintained to enhance ecological validity. It is important to note that positive effects of methylphenidate were found on several other measures collected during this program of studies.

ren's behavior (see Henker, Astor-Dubin, & Varni, in press; Whalen, Henker, Collins, McAuliffe, & Vaux, 1979; Whalen et al., 1981). Other behavioral categories were derived from hypotheses as to the nature of effects expected from seminaturalistic verbal provocations and from cognitive-behavioral intervention strategies. The measures included global rating scales, with emphasis on stylistic and treatment-related aspects of the child's total response to the provocation, as well as systematic, time-sampled behavioral categories.

Global Scales. Three scales were used, as follows: 1. Self-control—Each target's response was scored on a 1-5 scale, with 1 signifying very poor self-control (physical retaliation, screaming back at the teasers), 2 equaling poor self-control (much talking back, overt agitation, leaving the situation), 3 denoting average self-control (fidgeting, some talking back), 4 equaling good self-control (little or no evidence of anger but without a specific strategy or plan *or* average self-control with attempted plan), and 5 signifying exemplary self-control (no evidence of angry response *plus* evidence of overt plan to promote self-control).

2. Intensity—A 4-point scale was used to capture the stylistic vigor and forcefulness of the targets' behavior. A score of 1 signified a calm, peaceful style of behavior (regardless of its actual content), and the other anchor, 4, denoted behavior marked by extremely high levels of vigor, energy, and forcefulness. A 4-point rather than a 5-point scale was used here to avert overuse of a midpoint.

3. Strength of provocation—This 5-point global scale attempted to capture a qualitative judgment of the "heat" generated in the provocation, based on such features as the loudness of the taunts and the physical proximity of the taunters to the target (1 = mild, 5 = "on fire").

Time-sampled behaviors. Verbal signals were dubbed onto the videotapes, dividing each tape into 6-second observation intervals, with each interval followed by 4 seconds for scoring. Four verbal and five motoric behavior categories were scored as present or absent for each interval.

The verbal categories were (a) *Vocalization*—any sound emitted by the target without spoken words, e.g., laughter, shrieking, grunting; (b) *Disagree/redirect*—verbal statements directed toward the taunters that disagreed with the latter's statements ("I am not!") or that attempted to redirect or appease them ("You don't need to do that," "please stop"); (c) *Verbal retaliation*—verbal "fight back" responses: "You stink!" "I hate you," etc.; (d) *Neutral/other*—either verbal statements directed to the self ("I can take this"), calm conversations with peers or trainers, or any statements not fitting the above verbal categories.

The five motoric categories were (e) *Fidget*—the presence for more than 1 second of repetitive motion (tapping fingers, wiggling feet), restless

behavior (shifting in chair), or moving the head, hands, torso, or legs without apparent purpose; (f) *Move away*—moving body and/or chair away from the taunters; (g) *Purposeful alternate activity*—observable behavior designed to counteract the taunts, e.g., looking out window, tossing ball, looking at book, reciting to self; (h) *Physical retaliation*—involving either *attack* (attempted or actual aggressive physical response, including hitting, spitting, or kicking) or *gesture* (threatening gestures—e.g., pointing a finger, grimacing—directed toward the taunters).

The videotapes were scored by trained undergraduate observers who were blind to medication status and to time (before or after intervention) of the provocation. Four pairs of observers were used to reduce the possibility of “halo” effects. One pair of observers scored Self-control; a second, Intensity and Strength of provocation; a third pair scored the time samples of verbal behavior; and a fourth, the time samples of motoric behavior.

Results and Discussion

Interrater Agreement

For the global scales, Pearson product-moment correlations were computed between the scores of the pairs of raters. Self-control yielded $r = .86$ (29 of 40 tapes with perfect agreement); Intensity, $r = .87$ (24 of 40 with perfect agreement); and Strength of provocation, $r = .69$ (27 of 40 with perfect agreement). For the time-sampled behavior categories, percentages of agreement for occurrences of the behavior were calculated. These percentages were defined as agreements divided by agreements plus disagreements. Agreement percentages ranged from .70 (Vocalization) to .91 (Verbal retaliation), with $M = .77$ across the eight categories. (Because of relatively low frequencies, the two subtypes of Physical retaliation were combined for Study 1.)

For the time-sampled behaviors, one of the two raters per pair served as a “senior” rater whose data were entered into the analyses when the two raters did not agree. For the global scales, a third rater scored all tapes. When the two initial raters disagreed, the “consensus” score given by two of the three raters was used. In six instances (three for Self-control and three for Strength of provocation) there was no consensus, in which case the mean of the three ratings was used in the data analyses.

Relationships Among Measures

The intercorrelations among the 10 primary outcome measures—4 verbal categories, 4 motoric categories, Self-control, and Intensity—along

with Strength of provocation and duration (number of 10-second intervals per provocation) were calculated separately for each of the two behavioral tests. Strong and significant associations were found to exist between Self-control and Intensity for both: The greater the exhibited self-control, the less vigorous and intense the child's behavioral style ($r = -.85, p < .001$ for Test 1; $r = -.79, p < .001$ for Test 2). Self-control was also associated negatively with the specific behavioral components of Verbal retaliation ($r = -.41, p = .08$ for Test 1; $r = -.53, p < .05$ for Test 2) and Physical retaliation ($r = -.50, p < .05$ for Test 1; $r = -.53, p < .05$ for Test 2). Intensity was associated with Movements away from the taunters ($r = .52, p < .05$ for Test 1; $r = .43, p =$ for Test 2) and with Physical retaliation ($r = .55, p = .01$ for Test 1; $r = .39, p = .08$ for Test 2). No other relationships among the outcome measures were found to hold across both provocation tests.

Strength of provocation was related to two measures for Test 2 only: Disagree/redirect ($r = .57, p < .01$) and Move away ($r = -.54, p < .05$). That is, stronger provocations seemed to elicit more disagreement and, surprisingly, less movement away from the taunters. In addition, the duration of the provocation was associated with Move away ($r = -.48, p < .05$) and Physical retaliation ($r = -.40, p = .08$). Trainers apparently curtailed provocations during which participants attempted to escape or physically retaliate. To control for the differential length of the provocations in subsequent analyses of treatment effects, the mean number of occurrences per 10-second interval was entered for each time-sampled behavioral category.

Treatment Effects

Data were entered into 2 (medication status: methylphenidate, placebo) by 2 (behavioral test: pretest = 1, posttest = 2) analyses of variance. In each of these split-plot analyses, medication status constituted a between-subjects factor and behavioral test, a within-subject factor. A summary of pertinent results appears in Table I.

Medication effects were found for Intensity and for the motoric category, Move away. For Intensity, the methylphenidate mean was 1.75 and the placebo mean, 2.50, $F(1, 18) = 5.00, p < .05$. For Move away, the respective means were .05 and .22, $F(1, 18) = 5.31, p < .05$. Methylphenidate thus decreased the stylistic vigor of behavior and reduced one aspect of behavioral content—the tendency to leave the provocations. It is noteworthy that for all other variables the means in the methylphenidate condition were in the expected direction—greater self-control, fewer negative verbal and motoric behaviors, increased frequency of purposeful coping strategies—although significance was not reached.

Table I. Treatment Means for Study 1

Variable	Methylphenidate		Placebo		Total	
	Test 1	Test 2	Test 1	Test 2	Test 1	Test 2
Self-control (1-5)	3.00	4.50	2.50	3.70	2.75	4.10
Intensity (1-4)	2.00	1.50	2.70	2.30	2.35	1.90
Strength of provocation (1-5)	3.30	3.60	3.10	3.20	3.20	3.40
Duration (number of 10-second intervals)	3.40	3.30	3.30	3.10	3.35	3.20
Vocalization	.34	.10	.38	.20	.36	.15
Disagree/redirect	.05	.05	.14	.02	.10	.04
Verbal retaliation	.32	0	.31	.12	.31	.06
Neutral/other	0	.10	0	.05	0	.08
Fidget	.32	.25	.59	.24	.46	.25
Move away	0	.10	.21	.23	.10	.16
Purposeful alternate activity	.14	.77	.02	.60	.08	.69
Physical retaliation	.18	0	.31	.12	.25	.06

Following coaching and rehearsal of specific cognitive-behavioral strategies, subjects displayed greater levels of Self-control, $F(1, 18) = 25.14$, $p < .001$, were less likely to Vocalize $F(1, 18) = 5.47$, $p < .05$, showed markedly less Verbal retaliation, $F(1, 18) = 9.59$, $p < .01$, Fidgeted less, $F(1, 18) = 6.82$, $p < .05$, and showed strong evidence of use of Purposeful alternate activities, $F(1, 18) = 50.84$, $p < .001$ (see Table I). Marginally significant test effects were found for Intensity, Physical retaliation, and Disagree/redirect (p levels were between .05 and .08): Subjects were somewhat less intense, showed less physical aggression, and disagreed less with their peers during the second trial.

No interactions of medication with test reached statistical significance. One marginally significant interaction was detected, however, for the verbal category Disagree/redirect, $F(1, 18) = 4.01$, $p = .06$. In this case the boys' greater self-control, rated both globally and specifically, across the two tests, while the placebo level began much higher ($M = .14$) and then dropped markedly after the intervention ($M = .02$). Finally, no effects were revealed for Strength of provocation, duration, or the Neutral/other category of verbal behaviors.

The results of Study 1 were encouraging, particularly with respect to the boys' greater self-control, rated both globally and specifically, following intervention. After having received coaching in coping strategies, the participants inhibited angry or aggressive responses and also displayed active alternative behavioral responses. The lack of a control group for the brief cognitive-behavioral intervention, however, precludes unequivocal

interpretation of results. First, the positive effects noted during the posttest could be attributable to simple habituation—the repeated exposure to peer provocation. Participants may have handled the second provocation better because they were more familiar with the provocation environment. Yet the greatly increased use of purposeful alternate coping strategies during Test 2 indicates that active skills were learned (or prompted) during intervention. Such positive treatment effects, however, could be due simply to the attention given by trainers or to exposure to trainer role-plays of provocation, and not to any specific effects of cognitive-behavioral training. In order to elucidate more clearly the active components leading to self-control, a second study was conducted. In this second study, a more extensive intervention was compared with a control intervention equated for trainer attention and for exposure to cognitive problem-solving techniques but without training and rehearsal in specific cognitive-behavioral strategies.

STUDY TWO

Method

Subjects

Twenty-four boys between the ages of 8 and 13, (a) with a primary diagnosis from the treating physician of hyperactivity, hyperkinesis, or attention deficit disorder with hyperactivity, and (b) who had been receiving a stable dosage of methylphenidate for at least 3 months, were recruited for a 5-week summer enrichment program at UCLA. This program met daily from 8:30 a.m. until the early afternoon hours; its major purpose was to serve as a naturalistic research context for studies of social behavior patterns in and cognitive interventions for children with attentional deficits. (Twenty-four non problem comparison boys also participated in the program but were not included in the present study.) Selection criteria for the hyperactive boys were much the same as for Study 1. All but one of the hyperactive participants surpassed cut scores for attention deficit disorder on the basis of recently developed parental rating forms (Swanson, Nolan, & Pelham, 1981) and for hyperactivity on the authors' modification of the Conners Abbreviated Symptom Questionnaire (Conners, 1976). Emphasis was placed on finding boys with a previous history of favorable response to stimulant medication.

In addition to classroom and playground activities, the boys participated daily in cognitive-behavioral training groups. The focus of these tetrads was on the teaching of self-regulation skills. Study 2 occurred

in the training groups during the 3rd week of the program, following 2 weeks of training.

Intervention Procedures

Each training tetrad was led by either two clinical psychology graduate students or one advanced graduate student plus one advanced undergraduate. Each team of trainers led two tetrads each day. Once again, to ensure standardization of training format across groupings, all training sessions were carefully scripted (Hinshaw, Henker, & Whalen, 1981) and supervised. Each lasted 1 hour and 20 minutes, including a brief break.

The 1st week's training sessions focused on introduction of specific steps for problem solving, instruction in self-talk strategies, and discussion of attitudes and attributions toward stimulant medication. During the 2nd week, training focused on the application of cognitive self-instructional strategies to academic problems (see Cameron & Robinson, 1980; Douglas, 1980). Toward the end of the 2nd week, participants were told of the upcoming focus on social and interpersonal problems and were asked to disclose names and phrases that were particularly bothersome to them.

On Monday of Week 3, all tetrads began with provocation assessments similar in nature to those of the first behavioral test of Study 1. The provocations differed slightly in that there were now three peers plus two adults who served as provokers, and the length of time was increased to 60 seconds. Participants were put in the target position in random order within each tetrad. Following this pretest, each tetrad was randomly divided in half, with two boys and one trainer entering the cognitive-behavioral training condition and the other two boys and remaining trainer, the control condition. Trainers were counterbalanced across conditions, with each leading one dyad in each condition. For the remaining 40 minutes of Monday's session and for the full Tuesday session, the boys received differential intervention according to their assigned conditions. Finally, on Wednesday of the 3rd week, all participants and trainers from each tetrad reconvened, and the postintervention assessments were held, with a new random assignment of provocation orders.

Cognitive-Behavioral Condition. Drawing from the work of Douglas (1980) on self-control training and Novaco (1979) on stress inoculation, the training and rehearsals during this condition emphasized (a) recognition of the external threats or triggers that might produce anger; (b) identification of the cognitive and visceral signs of impending anger, along with the use of such recognition as a warning that problem-solving strategies would be required; (c) interpersonal problem solving, with particular emphasis on generation of alternative behavioral responses; and (d) development and

practice of specific strategies to effect self-control following provocation. Training was individually tailored: Each boy identified his own particular "signs" of anger and rehearsed a strategy of his own choosing to prepare for the second provocation. Trainer role-plays and participant rehearsals were then performed under increasingly realistic provocations, and trainers provided coaching in use of incipient anger as a cue to display the chosen strategy for self-control.

Control Training Condition. The focus here was on understanding the perspectives of other persons, recognizing the emotions surrounding provocation or threat, and enhancing empathy. The boys were asked first to recount the emotions they felt when they were taunted in the initial provocations. Trainers then directed them to imagine the reactions of others to retaliation. The goals were to facilitate social problem solving and perspective-taking (see Chandler, 1973; Marsh, Serafica, & Barenboim, 1980; Spivak & Shure, 1974) and to aid in recognition of the vicious cycle of emotions in a mutual provocation sequence, thereby increasing empathic responding. Participants were also asked to imagine alternate emotional states and the means by which these might be elicited—e.g., good feelings, brought on by cooperating rather than retaliating. Thus, control participants were trained in the cognitive procedures of perspective-taking and problem solving, but they did not receive (a) the stress inoculation procedures of cue-recognition or (b) specific strategy training and rehearsal.

Medication

For purposes of Study 2, the boys took their regularly prescribed dosages of either methylphenidate or placebo medication for the 3rd week of the program. A modified random assignment procedure was used such that two boys in each training tetrad were in the active medication condition and two in the placebo condition.⁵ In order to control for time-since-medication in this double-blind trial, methylphenidate was dispensed by program staff as the boys arrived each morning. All sessions were thus conducted within the period of maximum effectiveness of methylphenidate, that is, within 4 hours of ingestion. As in Study 1, medication was placed in transparent gelatin capsules to disguise the taste difference between methylphenidate and placebo. Morning dosages ranged from 5 to 40 mg ($M = 13.96$ mg) or from .15 to 1.16 mg/kg ($M = .41$ mg/kg). Twelve boys began in the medication condition and 12 in the placebo condition. Because of illness (1 boy in the methylphenidate condition) and refusal to cooperate

⁵A further constraint on random assignment was that, within tetrads, one boy in each medication condition was assigned to each training condition.

(1 boy in the placebo condition), 11 boys on medication and 11 on placebo completed the study. (It was also the case that 11 cognitive-behavioral and 11 control participants completed the provocations.)

Measures

All provocations from Study 2 were videotaped for scoring. A different set of undergraduate raters was trained to use the same measures employed in Study 1.⁶ Because of greater frequencies of occurrence, the two subtypes of Physical retaliation were scored separately in Study 2. As before, the raters were blind to medication status, intervention condition, and test (before or after training). Because fewer raters were available, one pair scored the verbal behavior categories and Intensity, and a second pair scored the motoric categories, Self-control, and Strength of provocation. This particular division of tasks was chosen to separate the scoring of Intensity from that of motoric behaviors and Self-control. To resolve scoring disagreements between members of the rater pairs, one additional observer scored Self-control and Strength of provocation, a second scored Intensity, and a third scored all of the time-sampled categories.

Results and Discussion

Interrater Agreement

For the global scales, Self-control yielded $r = .90$ (34 of 44 tapes with perfect agreement); Intensity, $r = .74$ (27 of 44 tapes with perfect agreement), and Strength of provocation, $r = .63$ (19 of 44 tapes with perfect agreement). Occurrence-only agreement percentages for the time-sampled categories ranged from .36 (Move away) to .86 (Physical retaliation: Attack), with a mean across the nine categories of .71. Because of extremely low frequencies of occurrence and unacceptably low occurrence-only agreement percentages, the categories Move away and Disagree/redirect were dropped from subsequent analyses. In instances of disagreement, consensus procedures similar to those of Study 1 were used. In the two cases of no consensus (one for Intensity, one for Strength of provocation), the means of the three raters' scores were used.

⁶The undergraduate raters for both studies were trained and supervised by the first author to ensure that identical criteria were used.

Relationships Among Measures

As in Study 1, Self-control was significantly associated with Intensity for both tests: the greater the exhibited self-control, the less intense the behavior ($r = -.76, p < .001$ for Test 1; $r = -.69, p < .001$ for Test 2). In addition, Self-control was correlated negatively with Verbal retaliations ($r = -.65, p < .001$ for Test 1; $r = -.70, p < .001$ for Test 2) and Physical retaliations of both types (r values ranged from $-.40$ to $-.80$ across both tests). Self-control was also associated with greater frequencies of Purposeful alternate activities for Test 2, the only test during which such behaviors occurred ($r = .64, p = .001$). Intensity was similarly associated with both Verbal and Physical retaliations: The greater the displayed intensity, the more frequent the display of both types of retaliation (r values ranged from $.60$ to $.80$ across both tests). Furthermore, Verbal and Physical retaliations (both subtypes of the latter) were significantly correlated across both tests (r values ranged from $.50$ to $.75$). Finally, Strength of provocation was associated significantly with only two other variables—Verbal retaliation and total Physical retaliations—and only during Test 1 ($r = .53, p < .05$ for Verbal and $r = .45, p < .05$ for Physical).

Treatment Effects

Data from the global scales and from the time-sampled behavioral categories were entered into 2(medication condition: methylphenidate, placebo) by 2(training condition: cognitive-behavioral, control) by 2(behavioral test: pretest = 1, posttest = 2) analyses of variance. Medication condition and training condition constituted between-subjects factors and test was a within-subject factor. Hypothesized effects of cognitive-behavioral training were revealed in the interaction of training condition with test. Table II presents pertinent results.

The sole medication effect was found for Intensity, $F(1, 18) = 4.54, p < .05$. As in Study 1, methylphenidate reduced the stylistic vigor and forcefulness of behavior (M for methylphenidate = 1.73; M for placebo = 2.41). For no other dependent measure did medication condition exert a main effect or interact significantly with training condition or test.

As for hypothesized effects of intervention, a significant interaction of training condition and test was found for Self-control, $F(1, 18) = 9.32, p < .01$. Boys trained in the specific strategies of the cognitive-behavioral condition improved 2 full points on the 5-point scale, while control subjects improved only 1/2 point (see Figure 1). Specific contrasts employing error

Table II. Treatment Means for Study 2

Variable	Cognitive-behavioral		Control	
	Test 1	Test 2	Test 1	Test 2
Self-control (1-5)	2.73	4.73	2.46	3.00
Intensity (1-4)	2.09	1.46	2.45	2.27
Strength of provocation (1-5)	3.00	3.09	3.09	3.36
Duration (number of 10-second intervals)	5.45	6.18	5.73	5.55
Vocalization	.23	.01	.07	0
Verbal retaliation	.13	0	.36	.20
Neutral/Other	0	.23	.01	.07
Fidget	.41	.14	.58	.22
Purposeful alternate activity	0	.76	0	.37
Physical retaliation: Attack	.05	0	.12	.15
Physical retaliation: Gesture	.05	0	.20	.12

terms from the omnibus analysis (Winer, 1971) revealed no difference between the groups before training, but afterwards, the cognitive-behavioral condition was superior, $F(1, 18) = 9.24, p < .01$. The training condition by test interaction was also significant for Purposeful alternate activity, $F(1, 18) = 4.27, p = .05$. No participants in either condition displayed any coping strategies before intervention; following training,

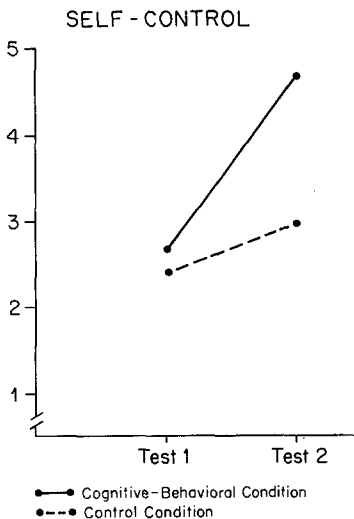


Fig. 1. Mean scores for Self-control by training condition and by test.

cognitive-behavioral boys displayed twice as many strategies as those in the control intervention, $F(1, 18) = 8.59, p < .01$.

Main effects for test, not qualified by interactions, were found for the variables Fidget, Vocalization, Neutral/other, and Verbal retaliation. Regardless of training condition, subjects decreased their fidgeting, laughter, and aggressive verbal statements and increased their neutral statements during the second provocation. A main effect for training condition was found for Verbal retaliation. No main effects or interactions were found for Strength of provocation, for either type of Physical retaliation, or for the number of intervals.

In sum, boys trained in the cognitive-behavioral condition used a significantly greater number of purposeful coping strategies and displayed significantly better self-control than did participants in the control intervention. Vocalizations, fidgeting, and verbal retaliations decreased significantly across tests regardless of training condition. Methylphenidate exerted an effect only on the intensity of the boys' behavior.

CONCLUSIONS AND ISSUES

As noted earlier, hyperactive children are readily discernible by their peers (Glow & Glow, 1980; Pelham & Bender, 1982). Furthermore, normal or typical children, when asked their opinions about a hyperactive peer, evidence rather elaborate patterns of pejorative terms, dire behavioral predictions, and sincere treatment recommendations, indicating cognitive networks that far transcend the information provided (Whalen, Henker, Dotemoto, & Hinshaw, 1983). The effects of such negative recognition are likely to be derision, scapegoating, and verbal or physical provocation. Critical to the interpersonal success of the hyperactive child is the ability to control inappropriately aggressive responses to such provocation and to develop constructive alternatives.

The behavioral tests of Study 2 provided evidence for the efficacy of cognitive-behavioral training in effecting self-control in general and promoting the use of active coping strategies in particular. Despite this significant advantage for the cognitive-behavioral approach with respect to coping responses, there was a surprisingly high rate of purposeful alternate behaviors for the control condition during the second provocation test ($M = .37$, compared to the cognitive-behavioral $M = .76$). The cognitive problem-solving techniques taught in this condition may have prompted such behaviors. It will be recalled, however, that the posttests took place in the original tetrads with random orders of provocation, thereby exposing half of the control participants to prior modeling of specific strategies by the boys trained in cognitive-behavioral techniques. A posthoc analysis of

the Test 2 data for the 11 control subjects revealed that 3 of the 5 boys exposed to such modeling displayed specific coping behaviors, compared with only 1 of the 6 boys who did not see the behaviors modeled. It is also noteworthy, however, that this apparent modeling effect did not lead to the same quality of response as did the cognitive-behavioral training: The group trained in the latter was clearly superior on the Self-control scale, which reflects both display of coping strategies and their efficacy. The unintended effects of peer modeling during the outcome assessment for Study 2 seem deserving of further study. Such peer modeling could—and probably should—be put to intentional use in constructing clinically robust and cost-effective intervention procedures for behaviorally disordered children (see Douglas, 1980; Sarason & Ganzer, 1973).

Findings from the present studies must be qualified in several respects. The intervention procedures were relatively brief, and the behavioral assessments were conducted "on cue." (The vehemence of the majority of the provocations, however, along with the reactions they elicited, placed them well beyond the realm of role-plays.) Next, assessment of positive effects of intervention was limited to overt, observable coping strategies. Assessment of cognitions—both as treatment effects per se and as correlates of overt behavioral change—was not a focus of the present studies. (See Kendall, Pellegrini, and Urbain, 1981, for pertinent discussion of assessment of cognitions in children.) Furthermore, generalized effectiveness across setting and time was not evaluated. Nevertheless, cognitive-behavioral stress inoculation procedures showed promise in their ability to promote self-control in hyperactive boys who were exposed to verbal provocation from peers. Assessment of longer interventions, of cognitive change, and of generalized efficacy are important goals for subsequent research.

The lack of medication effects in the present studies is somewhat surprising, particularly in view of the fact that these youngsters were selected, in part, for prior responsiveness to methylphenidate and did, in fact, evidence such responsiveness in other components of the research programs. It may be the case that brief provocation assessments and dependent measures focusing on aggression and deployment of coping strategies did not provide the optimal means for detecting stimulant effects. Furthermore, the status of medication condition as a between-subjects factor prevented the use of subjects as their own controls, enhanced sampling differences, and required the use of relatively larger error terms against which to assess medication effects. In the present studies, the major impact of medication was on stylistic aspects of behavior. As in Henker et al. (in press), Whalen, Henker, Collins, McAuliffe, and Vaux, (1979), and Whalen et al. (1981), methylphenidate decreased the intensity, vigor, and

forcefulness of behavior, even in the absence of significantly altering its content. Further assessment of the effects of medication on the content of interpersonal behaviors of hyperactive children is a pervasive research need.

The present studies can be viewed as part of a growing literature on the comparative and combinative efficacy of stimulant medication and psychosocial interventions (chiefly behavioral treatments) for hyperactive children (see Backman & Firestone, 1979; Mash & Dalby, 1979; K. D. O'Leary, 1980, for reviews; see also Pelham, Schnedler, Bologna, & Contreras, 1980). Results from some studies clearly favor medication (Gittelman et al., 1980), while other results suggest advantages for behavioral interventions (Ayllon, Layman, & Kandel, 1975; Rapport, Murphy, & Bailey, 1982; Wolraich, Drummond, Salomon, O'Brien, & Sivage, 1978). A host of variables—sampling; drug dosages; potency, content, and duration of behavioral training procedures; outcome measures—influence the conclusions of these evaluative reports. The present studies were not designed to allow a clear comparison of effects of methylphenidate and cognitive-behavioral training; such comparisons require use of no-treatment and expectancy controls for both interventions that are assessed (Hollon & Beck, 1978). The present studies do, however, point to the need for active strategy training to produce optimal results in helping hyperactive boys achieve self-control in anger-inducing situations. A major challenge will be to perform the necessary studies to evaluate the relative contributions of medication and such strategy training in effecting durable self-control.

In closing, it seems appropriate to offer some clinical observations and suggestions. The use of direct peer provocation, as both an assessment and a therapeutic technique, is not without risk to the participants. First, the boys are asked to divulge certain vulnerabilities by supplying the labels and phrases they find upsetting. Then, although the provocations are staged, they are delivered in a manner that is unquestionably enthusiastic and with a content that is decidedly unprintable. The jibes are mean, and they are real. Sometimes the boys go far beyond the labels and phrases supplied them and reach creative heights, especially in describing hypothetical behaviors of the target child's parents. It takes a great deal of skill on the part of the therapist-trainers to keep the boys oriented or reoriented toward mutual self-help goals.

We think the value of these techniques to the participants greatly outweighs the risks. Nonetheless, there is little doubt that some of the vulnerabilities exposed during these intense sessions can later be exploited. For these reasons we suggest that such training and assessment be conducted only within an ongoing treatment/research program and only when an atmosphere of mutual trust has been established. It is best done,

we think, in a clinical treatment setting (rather than in the child's regular environments) where it is taken for granted that the task is to learn some new skills and where self-disclosures are routine and do not expose the child to additional stigmatization.

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